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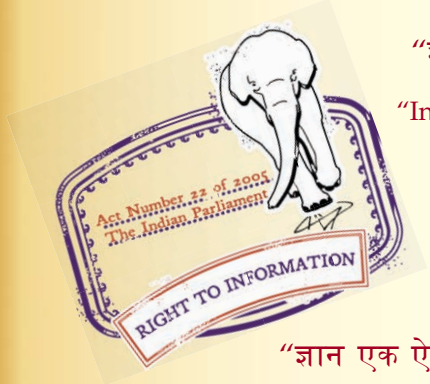
IS 4658 (1988): Coated paper and board (art and chromo)
[CHD 15: Paper and its products]



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Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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IS 4658 : 1988
(Reaffirmed 2008)

Indian Standard

SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(First Revision)

Second Reprint JANUARY 2010
(Including Amendments No. 1, 2, 3 & 4)

UDC 676.262

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

February 1989

Price Group 3

AMENDMENT NO. 1 SEPTEMBER 1993
TO
IS 4658 : 1988 SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(First Revision)

(*Page* 1, *clause* **0.5**) — Add this new clause after clause **0.4** and renumber the subsequent clause:

'**0.5** A scheme for labelling environment friendly products known as ECO Mark has been introduced at the instance of the Ministry of Environment and Forests (MEF), Government of India. The ECO Mark would be administered by the Bureau of Indian Standards (BIS) under the BIS Act, 1986 as per the Resolutions No. 71 dated 21 February 1991 and No. 425 dated 28 October 1992 published in the Gazette of the Government of India. For a product to be eligible for marking with ECO logo, it shall also carry the ISI Mark of BIS besides meeting additional optional environment friendly requirements. For this purpose, the Standard Mark of BIS would be a single mark being a combination of the ISI Mark and the ECO logo. Requirements to be satisfied for a product to qualify for the BIS Standard Mark for ECO friendliness, will be inlcuded in the relevant published Indian Standards through an amendment. These requirements will be optional; manufacturing units will be free to opt for the ISI Mark alone also.

This amendment is based on the Gazette Notification No. 455 dated 13 November 1992 for paper as environment friendly products published in the Gazette of India. This amendment is, therefore, being issued to this standard to include environment friendly requirements for coated paper and board (art and chromo).'

(*Page* 2, *clause* **3.5**) — Add the following new clause after **3.5**:

'**3.6 Optional Requirements for ECO Mark**

3.6.1 *General Requirements*

3.6.1.1 The product shall conform to the requirements for quality and performance prescribed under clauses **3.1** to **3.5**.

3.6.1.2 The manufacturer shall produce to BIS, the environmental consent clearance from the concerned State Pollution Control Board as per the provisions of Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Polution) Act, 1981 along with the authorisation, if required, under the Environment (Protection) Act, 1986 and the rules made thereunder, while applying for ECO Mark.

3.6.2 Specific Requirements

3.6.2.1 The material shall be of the following two types depending on the raw material used in the manufacture:

a) *Type A* — Manufactured from pulp containing not less than 60 percent by mass of pulp made from materials other than bamboo, hard woods, soft woods and reed.

b) *Type B* — Manufactured from pulp made from 100 percent waste paper.'

(*Page* 2, *clause* **4.1**) — Add the following new clause after **4.1**:

'**4.1.1** For ECO Mark, the product shall be packed in such packages which shall be recyclable/reusable or biodegradable.'

(*Page* 2, *clause* **4.2**) — Add the following new clause after **4.2**:

'**4.2.1** For ECO Mark, following additional information may also be marked on the container/package:

The criteria for which the product has been labelled with ECO Mark.'

(CHD 015)

AMENDMENT NO. 2 MAY 2002
TO
IS 4658 : 1988 SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(First Revision)

(*Page* 2, *Table* 2) – Substitute the following for the existing table:

Table 2 Requirements for Coated Board

(*Clause* 3.2)

Sl No.	Characteristic	Requirement	Methods of Test, Ref to			
			Appendix	Cl No. of IS 1060 (Part 1) : 1966*	Cl No. of IS 1060 (Part 2) : 1960†	Cl No. of IS 9894 : 1981‡
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Burst index, kPa.m^2/g , *Min*	0.8	—	12.5	—	—
ii)	Wax picks§	No pick on 5A	B	—	—	—
iii)	Surface, *p*H	5.5 to 8.0	C	—	—	—
iv)	Gloss percent, *Min*		—	15	—	—
	a) Art board	45				
	b) Chromo board	30				
v)	Brightness, percent, *Min* (coated side only)	80	—	—	13	—
vi)	Stiffness factor, *Min*	175	D	—	—	—
vii)	Cobb value, g/m^2, *Max*		—	13.2.2	—	—
	a) Art board (coated side)	25				
	b) Chromo board:					
	1) coated side	25				
	2) uncoated side	22				
viii)	Smoothness (Bendsten) ml/min, *Max*		—	—	—	3
	a) Art board (both sides)	75				
	b) Chromo board (coated side)	75				
ix)	Bulk, cc/g, *Min*		—	8	—	—
	a) Art board	1.0				
	b) Chromo board	1.1				

AMENDMENT NO. 3 SEPTEMBER 2008
TO
IS 4658 : 1988 SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(First Revision)

(*Page* 2, *clause* **3.6**, *read with Amendment No.* 1) — Substitute '**Additional Requirements for ECO Mark**' *for* '**Optional Requirements for ECO Mark**'.

(CHD 15)

AMENDMENT NO. 4 SEPTEMBER 2009
TO
58 : 1988 SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(First Revision)

'e 1, *Table* 1, *col* 3, *Sl No.* (v)] — Substitute '75' *for* '70'.

Indian Standard

SPECIFICATION FOR COATED PAPER AND BOARD (ART AND CHROMO)

(First Revision)

0 FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 8 April 1988, after the draft finalized by the Paper and its Products (Excluding Packaging Materials) Sectional Committee had been approved by the Chemical Division Council

0.2 This standard has been formulated to define the quality of coated paper and boards (art and chromo). Art papers and boards are coated on both sides while chromo papers and boards are coated only on one side. These papers are generally used for fine decorative printing.

0.3 This standard was originally published in 1968. In this revision, new requirements on stiffness, cobb value, smoothness and bulk have been incorporated with a view to upgrade the quality of the coated board (art and chromo). Further, the requirement on burst factor has been replaced by burst index.

0.4 The test method of finding the coating weight does not always give the reliable value because the coating does not come out easily owing to the nature of the pigment binder present. The characteristics like brightness, gloss, smoothness, etc, are dependent on the coating and are covered in the standard. The Committee, therefore, felt that the coating mass may be given for guidance only. The coated papers and board may have the minimum mass of coating of 12 and 15 g/m^2, respectively, when tested as prescribed in Appendix A.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Rules for rounding off numerial values (*revised*).

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for coated paper and board (art and chromo).

2. TERMINOLOGY

2.0 For the purpose of this standard, the definitions given in IS : 4661-1986* shall apply.

3. REQUIREMENTS

3.1 General — The paper or board shall be uniform in thickness, generally free from holes, hard spots and lumps, shall lie flat and be dimensionally stable. The printing surface shall be smooth, of even finish, formation, absorbency and colour. Both sides in the case of art paper and board, and coated side in the case of chrome paper and board, shall be clean and free from loosely bound fibres and blisters.

3.2 The coated paper and coated board shall also comply with the requirements given in Tables 1 and 2 respectively, when tested in accordance with the methods referred to in col 4, 5, 6 and 7 of the tables.

*Glossary of terms used in paper trade and industry (*first revision*).

TABLE 1 REQUIREMENTS FOR COATED PAPER
(*Clause* 3.2)

Sl No.	Characteristic	Requirement	Methods of Test, Ref to		
			Appendix	Cl No. of IS : 1060 (Part 1)-1966*	Cl No. of IS : 1060 (Part 2)-1960†
(1)	(2)	(3)	(4)	(5)	(6)
i)	Burst index, kPa.m^2/g, *Min*	0·9	—	12·5	—
ii)	Wax pick‡	No pick on 5 A	B	—	—
iii)	Surface *p*H	5·5 to 8·0	C	—	—
iv)	Gloss percent, *Min*				
	a) Art paper	55		15	—
	b) Chromo. paper	50			
v)	Brightness (on coated side), *Min*	70	—	—	13

*Methods of sampling and test for paper and allied products : Part 1 (*revised*).

†Methods of sampling and test for paper and allied products: Part 2.

‡Not applicable when synthetic resin is used.

TABLE 2 REQUIREMENTS FOR COATED BOARD

(*Clause* 3.2)

Sl No.	Characteristic	Requirement	Method of Test, Ref to			
			Appendix	Cl No. of IS : 1060 (Part 1)-1966*	Cl No. of IS : 1060 (Part 2)-1960†	Cl No. of IS : 9894-1981‡
(1)	(2)	(3)	(4)	(5)	(6)	(7)
i)	Burst index, kPa.m²/g	0·8	—	12·5	—	—
ii)	Wax pick§	No pick on 5 A	B	—	—	—
iii)	Surface *p*H	5·5 to 8·0	C	—	—	—
iv)	Gloss, percent, *Min*		—	15	—	—
	a) Art board	45				
	b) Chromo board	30				
v)	Brightness (on coated side), *Min*	70	—	—	13	—
vi)	Stiffness factor, *Min*	175	D	—	—	—
vii)	Cobb value, *Max*					
	a) Front	25	—	13.2.2	—	—
	b) Back	25				
viii)	Smoothness, sec/50 ml, *Max*	—	—	—	—	4
	a) Front	60				
	b) Back	500				
ix)	Bulk, cc/g, *Min*	1·2	—	8	—	—

*Methods of sampling and test for paper and allied products: Part 1 (*revised*).
†Methods of sampling and test for paper and allied products: Part 2.
‡Methods of test for smoothness/roughness of paper.
§Not applicable when synthetic resin is used.

3.3 Tolerance on Thickness — When tested in accordance with 7 of IS : 1060 (Part 1)-1966*, the following tolerance shall be allowed on the nominal thickness:

Nominal Thickness	*Tolerance*
500 microns and below	± 20 microns
501 microns and above	± 25 microns

3.4 Substance and Tolerance on Substance — The substance of the coated paper and board (art and chromo) shall be as agreed to between the purchaser and the supplier. A tolerance of ±2·5 percent for coated paper and ±5 percent for coated board shall be allowed on the nominal substance when tested in accordance with 6 of IS : 1060 (Part 1)-1966*.

3.5 Sizes and Tolerance on Sizes — The sizes of the coated paper and the board shall be in accordance with IS : 1064-1980†. The permissible tolerance shall be in accordance with 4 of IS : 1064-1980†.

4. PACKING AND MARKING

4.1 The packing of paper or board shall be done so as to ensure that the paper or board is not damaged due to handling and transportation (*see* IS : 6211-1971*) and shall be as agreed to between the purchaser and the supplier.

4.2 Each package shall be marked with the following particulars:

a) Description, thickness in μm, and substance in g/m² of the paper or board;

b) Size of the paper or board in the package;

c) In the case of sheets, the mass in kg per ream of 500 sheets including the wrapping paper when determined in accordance with the method prescribed in Appendix E;

d) Lot number;

e) Month and year of manufacture; and

f) Manufacturer's name or recognized trademark, if any.

4.3 Each package may also be marked with the Standard Mark.

Note — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection,

*Methods of sampling and test for paper and allied products: Part 1 (*revised*).

†Specification for paper sizes (*second revision*).

*Code of practice for packaging of paper and board.

testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

5. SAMPLING AND CRITERIA FOR CONFORMITY

5.1 Sampling — Representative samples for tests shall be drawn as prescribed in 3 of IS : 1060 (Part 1)-1966*.

5.2 Number of Tests — From each of the packets selected from the lot (*see* **5.1**), one sheet shall be taken out at random. These sheets shall constitute the sample. The sheets selected shall first be tested for the general requirements given in **3.1**. One test piece shall be cut from each selected sheet and for each of the characteristics mentioned in Tables 1 and 2 and in **3.3** to **3.5**, and tested. A sheet not meeting the requirements for any one or more characteristics shall be considered as defective.

5.3 Criterion for Conformity — A lot shall be declared as conforming to all the requirements of this specification if the number of defective sheets found does not exceed the acceptance number. This acceptance number shall depend upon the size of the sample and shall be zero if the size is less than 13 and one if it is greater than or equal to 13.

*Method of sampling and test for paper and allied products: Part 1 (*revised*).

APPENDIX A

(*Clause* 0·4)

DETERMINATION OF COATING

A-0. GENERAL

A-0.1 This method is suitable for quantitative determination of the coating on ordinary types of mineral coated papers. It is not intended for special types of coated papers in which lacquers, varnishes or similar materials are used.

A-1. TEST SPECIMEN AND CONDITIONING

A-1.1 The test specimen shall be cut from the sample in such a way as to be thoroughly representative of the paper. The specimen shall consist of a sheet of paper not less than 150 cm^2 in area. Condition all the test specimens as prescribed in 5 of IS : 1060 (Part 1)-1966*.

A-2. REAGENTS

A-2.1 Enzyme Solution — Prepare an aqueous solution containing 1·5 g of a suitable enzyme and 25 ml of 0·1 N caustic soda solution per litre.

NOTE 1 — The enzyme recommended is trypsin but some of the mixtures of enzymes used commercially for desizing cotton and degumming silk have been found to be more rapid in action, less expensive and more stable.

NOTE 2 — While an enzyme may not be essential if starch is the only adhesive used, it will not interfere with the removal of the coating in such cases, and it is essential where casein is the binder.

A-3. PROCEDURE

A-3.1 Measure the area of the test specimen with an accuracy of ±0·5 percent. Weigh the test specimen with an accuracy of ±0·5 percent. From the data, calculate the substance of the paper according to **6** of IS : 1060 (Part 1)-1966*.

A-3.2 Lay the specimen in a flat-bottomed tray, preferably of glass, with the coated side of the specimen up. Cover the specimen completely with the enzyme solution and allow it to stand for at least 1 h at 50°C. If the paper is coated on both sides, pour off the enzyme solution, reverse the specimen in the tray, recover with the enzyme solution, and again allow to stand for at least 1 h at 50°C. Remove the test specimen from the enzyme solution, lay it on a plane glass surface, and brush off the coating, using a camel hair brush and taking care not to dislodge paper fibres. Additional treatment with the enzyme solution and heating may be required for very resistant coating.

A-3.3 After the coating appears to be entirely removed, stand the glass pane with the test specimen on it at a slight angle and, using a wash bottle, wash each side of the specimen with water while it is held against glass, by one corner. When the specimen appears to be thoroughly washed, dry it at room conditions, then allow it to come to equilibrium with the standard atmosphere, and again weigh with an accuracy of ± 0·5 percent and calculate the substance according to **6** of IS : 1060 (Part 1)-1966*.

A-4. CALCULATION

A-4.1 Coating in $g/m^2 = p - q$

where

p = substance in g/m^2 of the coated paper, and

q = substance in g/m^2 of the paper after the coating has been removed.

*Methods of sampling and test for paper and allied products: Part 1 (*revised*).

*Methods of sampling and test for paper and allied products: Part 1 (*revised*).

APPENDIX B

[*Tables* 1 *and* 2, *Item* (ii)]

METHOD FOR DETERMINATION OF WAX PICK NUMBER

B-0. GENERAL

B-0.1 Waxes — The Dennison standard paper testing waxes are available in a series with graded adhesive powers. The complete series consists of 18 waxes from 2A to 26A, the adhesive strength increasing with the number.

B-1. PROCEDURE

B-1.1 Condition the test specimen as prescribed in 5 of IS : 1060 (Part 1)-1966*.

B-1.2 Place the test specimen on a smooth surface, such as hardwood block or table glass. Metal surfaces and artificially cooled surfaces shall not be used. The sample sheet should be separated from the block or table by 8 or 10 sheets of paper.

B-1.3 Select a wax stick, be certain that the end is clean and flat. Heat the end over an alcohol or low gas flame, rotating slowly until several drops of melted wax have fallen. Take care that the wax does not catch fire.

B-1.4 Quickly place the melted wax end on the surface of the specimen, with firm but not undue pressure, and withdraw the fingers immediately. Allow 15 minutes for the wax to cool.

B-1.5 Place a wooden block with a hole over the wax stick, with the stick protruding through the hole in the block; press the block down firmly with one hand and with the other, pull the wax stick from the sheet with a quick jerk at right angles to the paper surface.

B-1.6 Examine both the end surfaces of the wax stick and the specimen. Repeat the test using the waxes in advancing numerical orders until the sample surface blisters, breaks, picks or lifts.

B-1.7 Record as wax pick number, the highest numbered wax which does not disturb the surface of the board.

*Method of sampling and test for paper and allied products: Part 1 (*revised*).

APPENDIX C

[*Tables* 1 *and* 2, *Item* (iii)]

DETERMINATION OF SURFACE *p*H

C-1. APPARATUS

C-1.1 *p*H Meter — Any standard *p*H meter with glass electrode and a single combination electrode calibrated against standard buffer solutions at two *p*H values (*see* **C-2.1**).

C-2. REAGENTS

C-2.1 Buffer Solutions — Two standard solutions, one with *p*H 4 and other with *p*H 9.

C-2.2 Distilled Water — *p*H 6·0 to 7·2 and carbon dioxide free.

C-3. PROCEDURE

C-3.1 Cut a test specimen approximately 50 × 50 mm from the sample sheet drawn as prescribed in **5.1.** Place one large drop of distilled water on the test piece and place the electrode in drop, also touching the paper. Take the reading on *p*H meter after about two minutes.

APPENDIX D

[*Table* 2, *Item* (vi)]

TEST FOR STIFFNESS

D-0. OUTLINE OF THE METHOD

D-01. It involves the measurement of the force required to bend a test piece clamped at one end through a given angle, the force being applied at a constant distance from the line of clamping.

D-1. APPARATUS

D-1.1 Any system may be used that is capable of acting on the test piece to measure the bending force to a degree of precision in accordance with the specification for instrument accuracy.

D-1.2 The clamp should grip the test piece across its full width and along its length for a distance of not less than 12·7 mm when test pieces are inserted. The test piece should not be restrained at the free end except by the friction imposed by the surface of the free end of the test piece on the indicating or recording mechanism.

D-1.3 The nominal bending length is 10 mm. This bending length allows the use of several types of instruments that have been found satisfactory. For the most accurate work, however, the results shall be corrected for differences in the nominal bending length.

D-1.4 The instrument employed shall comply with the following requirements, within the given limits of accuracy:

a) Bending angle 15·0 ± 0·1°;

b) Bending length 38·0 $^{+\ 2{\cdot}5}_{-\ 0{\cdot}1}$ mm;

c) Test piece width 38·0 ± 0·2 mm;

d) Rate of bending such that a bending angle of 15° is reached in not less than 3s and not more than 20s. It is essential that bending during the test is continuous and the rate of bending should be reasonably constant; and

e) Scale readings accurate to ±2 percent on the appropriate range.

D-1.5 Equipment for the cutting of the test piece to the required accuracy is also needed. This may consist of a knife and a template, a guillotine or a punch.

D-2. PROCEDURE

D-2.1 Select units and sheets and take the specimens according to 3 of IS : 1060 (Part 1)-1966*.

D-2.2 The samples shall be conditioned in accordance with 5 of IS : 1060 (Part 1)-1966*, and sample preparation and testing shall be carried out in the conditioning atmosphere specified.

D-2.3 Cut test pieces 38·0 ± 0·2 mm wide and 38 ±5 mm long. A minimum number of ten test pieces is required in each test direction. There shall be no folds, creases, visible cracks or other defects on the area to be tested and the test piece shall not include any part of the sample that is less than 15 mm from the edge of the sheet or reel. If watermarks are present, this should be stated in the test report.

NOTE — When testing the machine direction or cross direction stiffness of the paper, the appropriate direction is perpendicular to the width of the test piece.

D-2.4 Carry out the operations involved in measurement of stiffness of each test piece in the manner recommended for the type of instrument in use.

D-2.5 Insert the test piece in the clamp in such a manner that the length that projects from the clamp (the free length) is 10 ± 3 mm and the test piece is correctly aligned.

D-2.6 The standard bending angle is 15°.

D-2.7 Deflect each test piece through an angle of 15° to one side of the unstressed position and then immediately return the test piece through the zero position and deflect it through an angle of 15° to the other side of the unstressed position. In each direction, take the reading as soon as 15° deflection has been reached. Should the instrument be so designed the deflection is possible to one side only of the unstressed position, then equal number of test pieces with opposing surfaces towards the direction of deflection should be tested. No test piece shall be re-used after it has been removed from the instrument clamp.

D-2.8 When each test piece is deflected to both sides of the unstressed position, ten test pieces and twenty readings are required. For instruments in which each test piece is deflected to only one side of the unstressed position, twenty test pieces and twenty readings are required. Where a distinct partial fracture or considerable permanent deformation of the test piece occurs during a test, the results of this test shall be ignored.

D-3. CALCULATIONS AND EXPRESSION OF RESULTS

D-3.1 Calculate the arithmetic mean of the twenty readings and express the result as stiffness factor. For instruments giving readings of stiffness in newtons, the result may be expressed by dividing the reading in newtons by $9{\cdot}81 \times 10^{-3}$. For instruments giving readings as values of bending moment in gramforce centimetres (sometimes called 'Units' or 'Taber units') the result may be expressed as stiffness factor by dividing the units figure by $9{\cdot}81 \times 10^{-2}$ and the bending length in centimetres. For the most accurate work, the effect of the precise bending length used on the stiffness shall be taken into account.

Hence,

$$\text{Stiffness} = \frac{L^2}{2\,500} \times \text{measured bending force}$$

where

L = bending length in mm.

D-4. TEST REPORT

D-4.1 The test report shall include the following particulars, results being given separately for machine direction and cross direction tested:

a) Description and identification of the material tested,

b) The type of instrument used,

c) The direction of the test,

d) The number of replicate tests carried out if other than ten (or twenty), and

e) The mean stiffness factor.

*Methods of sampling and test for paper and allied products: Part 1 (*revised*).

APPENDIX E

[*Clause* 4.2 (c)]

DETERMINATION OF NOMINAL MASS OF REAM

E-1. The nominal mass of ream of paper shall be calculated according to the following formula:

$$R = \frac{(A \times B \times C) + D}{1\,000}$$

where

R = nominal mass of reams of paper in kg,

A = nominal substance of paper in g/m^2,

B = nominal number of sheets of paper a ream,

C = nominal area of each sheet in m^2, and

D = nominal mass of wrapping paper in g.

Bureau of Indian Standards

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Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

Amendments Issued Since Publication

Amendment No.	Date of Issue	Text Affected

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